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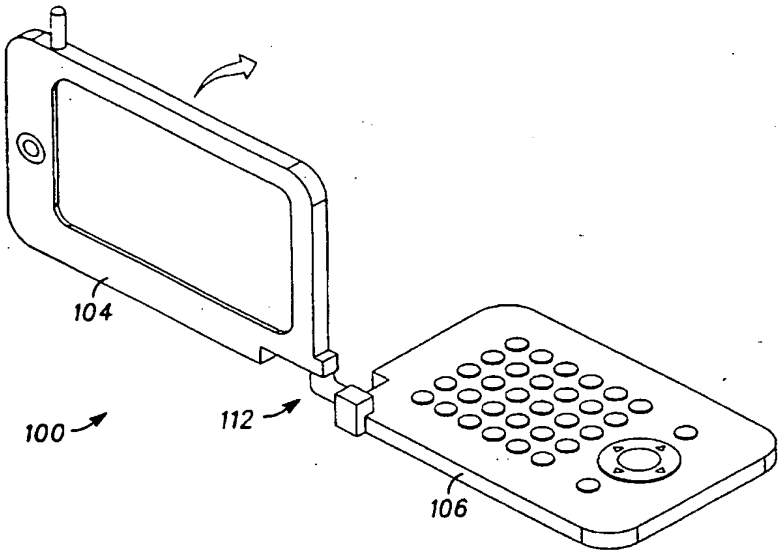
(54) Title: SELF CONFIGURING MULTIPLE ELEMENT PORTABLE ELECTRONIC DEVICE



(57) Abstract: A self configuring multiple element portable electronic device (100) and method is provided. The device comprises at least a first electronic element (104) and a second electronic element (106) and a joint (112) connecting the first electronic element and the second electronic element, with the joint allowing movement in more than one plane of the first electronic element in relation to the second electronic element, wherein the self configuring multiple element portable electronic device is capable of self configuring an operational mode based on a relative position of the first electronic element with respect to the second electronic element. The method comprises the steps of detecting a relative position of the first electronic element relative to the second electronic element, and selecting an operational mode of the device based on the relative position.

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SELF CONFIGURING MULTIPLE ELEMENT PORTABLE ELECTRONIC DEVICE

BACKGROUND OF THE INVENTION

The present invention relates generally to portable electronic devices, and more particularly to portable electronic devices having multiple elements.

Many portable electronic devices exist that are designed for making life easier and more productive. Devices such as cellular phones, pagers, and personal digital assistants (PDAs) perform valuable functions such as communications, messaging, data storage and recall, etc.

These portable electronic devices often have two parts, a hinged cover having a display and a body having a keyboard. The display is typically chosen to match the intended purpose. For example, PDAs typically have a relatively large display, useful for displaying text and graphics. Cellular phones, on the other hand, typically have smaller displays designed for displaying a limited number of alphanumeric characters. This makes sense, as production costs may be kept down by including only the required capabilities in the device.

More and more, people find such portable electronic devices to be invaluable for keeping in touch with co-workers, family, and friends, and for organizing a busy lifestyle. As the demand for portable electronic devices increases, these devices tend to increase in functions, features, and complexity. However, such devices still tend to remain as distinct units due to the increased complexity and difficulty of use that often comes with integration of multiple devices.

Integration of multiple devices is understandably difficult, due to the need for providing different functions that intermesh operationally while sharing inputs, outputs, and other resources. This is further complicated by the need to create a device that is intuitively simple to use.

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Non-integration of portable electronic devices produces several drawbacks. First, there are the obvious drawbacks such as needing multiple devices to accomplish all desired functions, along with the attendant size and weight inconvenience. Second, non-integration means that multiple devices have duplicate components, such as heavy and bulky displays, input devices, and power sources. Third, the increased use of microprocessors and their increasing capabilities allow devices to be developed that are flexible and can be configured to perform multiple functions. Fourth, integrating devices to share common components and to cooperatively function could provide increased value to consumers while reducing prices.

There remains a need in the art, therefore, for improvements in portable electronic devices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1-8 show a self-configuring multiple element wireless portable electronic communication device having a first element joined to a second element by a joint;

FIG. 9 shows various input and output devices and other features;

FIG. 10 shows a first joint embodiment along with a positional sensor device arrangement; and

FIGS. 11-15 show various embodiments of a position sensor;

FIGS. show a second embodiment of the joint;

FIGS. 16-18 show detail of a socket of the second embodiment;

FIG. 19 shows two resulting predetermined positions of detents of the second embodiment;

FIG. 20 shows detail of the ball and the socket of the second embodiment;

FIG. 21 shows a graph of a communication signal superimposed on a power voltage; and'

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FIG. 22 shows a digital communication signal removed from the power voltage.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A self configuring multiple element wireless portable electronic communication device is provided according to a first aspect of the invention. The device comprises at least a first electronic element and a second electronic element and a joint connecting the first electronic element and the second electronic element, with the joint allowing movement in more than one plane of the first electronic element in relation to the second electronic element, wherein the self configuring multiple element portable electronic device is capable of self configuring an operational mode based on a relative position of the first electronic element with respect to the second electronic element.

A self configuring multiple element wireless portable electronic communication device is provided according to a first aspect of the invention. The device comprises at least a first electronic element and a second electronic element, a shaft affixed to the first electronic element of the hand-held device and having at least two lengthwise electrical conductor elements separated by an electrical insulator material, a ball formed on an end of the shaft, and a socket formed on the second electronic element, the socket including a plurality of spring loaded contacts adapted to press against the ball, with the plurality of spring loaded contacts adapted to contact the at least two lengthwise electrical conductor elements and electrically communicate with the at least two lengthwise electrical conductor elements, wherein the ball and the socket allow movement in more than one plane of the first electronic element in relation to the second electronic element, and wherein the contacts form a sensor for detecting a relative position of the first electronic element relative to the second electronic element, and wherein the self configuring multiple element portable electronic device is capable of self configuring an operational mode based on a relative position of the first electronic element with respect to the second electronic element.

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A method for self configuring an operational mode in a self configuring multiple element wireless portable electronic communication device having a first electronic element that may be moved in relation to a second electronic element is provided according to a third aspect of the invention. The method comprises the steps of detecting a relative position of the first electronic element relative to the second electronic element, and selecting an operational mode of the device based on the position.

Now turning to FIGS. 1-8 show a self-configuring multiple element wireless portable electronic communication device 100 having a first element 104 joined to a second element 106 by a joint 112. FIGS. 1-4 show a configuration sequence wherein the first element 104 and the second element 106 are manipulated to place the device 100 into a portrait configuration.

FIG. 4 shows a self-configuring device 100 when it is configured in a portrait configuration such as, for example, a cellular phone. A long dimension of the typically rectangular display 120 is vertically (or longitudinally) positioned when in use. Because the display 120 is therefore positioned like a portrait of a person, it is known as a portrait mode. The portrait configuration is also reflected in the inputs 115 of the second element 106, which may be configured to reflect the portrait mode and may include numeric keys and other phone keys. The first element 104 may be rotated down to a closed position parallel to and in contact with the second element 106 to assume a closed configuration (not shown). This is typical of a cellular phone wherein a body and a lid may be folded together and closed during non-use.

FIGS. 5-8 show a configuration sequence wherein the first element 104 and the second element 106 are manipulated to place the device 100 into a landscape configuration.

FIG. 8 shows the self-configuring multiple element portable electronic device 100 in a landscape configuration, such as, for example, a pager. In the landscape configuration, the display 120 has the long dimension in a substantially lateral position,

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as is the second element 106. This may also be appropriate for a device such as a PDA or other electronic appliances. Again, the first element 104 may be rotated down to a closed position parallel to and in contact with the second element 106 to assume a closed configuration (not shown).

Referring now to FIG. 9, the various input and output devices and other features are discussed. In a typical configuration, the first element 104 contains a display 120. The display 120 may be any common display device, such as an LCD screen, a fluorescent display, a TFT display, or a CRT, for example. The display 120 in a cellular phone type configuration may be used to display phone related functions such as name and number storage, speed dial information, or phone control and operation settings, for example. In pager or PDA type operational modes, the display 120 may be used to provide a variety of graphics, images, text, or combinations thereof. The orientation of the display 120 may be self configured by the device 100 to match the overall orientation of the self-configuring multiple element portable electronic device 100.

Also included in the first element 104 may be an antenna 126 and a camera 129. The camera 129 is preferably a video camera, but alternatively may be a still digital camera. The antenna polarization may be modified to reflect the configuration (i.e., a horizontal polarization in the portrait mode and a vertical polarization in the landscape mode, for example).

The second element 106 may contain inputs 115 such as, for example, a keyboard. Alternatively, other input devices (not shown) may include a pointing device such as a joystick and buttons used on laptop or notebook computers, a track ball, a touch pad, a rocker switch, a touch screen, a TTY input device for disable persons, a braille key input, or a pad for handwriting pen, for example. The orientation of the inputs 115 will be self configured to match the overall orientation of the self-configuring multiple element portable electronic device 100.

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The joint 112 joins the first element 104 to the second element 106 and allows the first element 104 to move with respect to the second element 106. This movement may be in two planes, unlike a typical cellular phone which consists of a body with a hinged cover that moves in only one plane.

Although the present invention is shown as having only two elements, it should be understood that the present invention also applies to portable electronic devices having three or more elements. In such cases, multiple joints 112 may be employed.

The joint 112 may optionally include one or more detents wherein a detent position provides a bias to hold the first element 104 in a predetermined position in relation to the second element 106. Two such detents are preferably located to provide the relative positions shown in FIGS. 4 and 8.

It can be seen from the figures that the joint 112 allows the first element 104 and the second element 106 to move with respect to each other, allowing various positions of the two elements. The joint 112 of the present invention also allows the device 100 to sense the relative positions of the first element 104 and the second element 106. Because of this ability to determine the relative positions, both the display device 120 and the inputs 115 may be configured by the portable electronic device 100 into either a landscape mode or a portrait mode.

In addition to the changing of the orientation of displayed graphics or text, the orientation and arrangement of the individual keys or input elements of the inputs 115 may also be modified. For example, in a portrait (cellular phone) mode the input keys may be arranged so that they are properly oriented when the portable electronic device 100 is in a vertical portrait position (see FIG. 4). In the landscape mode, the first element 104 and second element 106 are substantially parallel and horizontally positioned, and the input keys may be configured in a horizontal orientation (see FIG. 8).

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Although FIGS. 1-8 show both configurations starting from a similar initial configuration, it should be noted that the device 100 may be directly manipulated from one configuration to the other, without necessarily having to proceed to the configuration shown in FIG. 1.

The input keys may be reoriented by simply including multiple symbols or characters on each key (oriented in both portrait and landscape positions). Alternatively, the inputs 115 may include a touch-screen display that is capable of reconfiguring and reorienting the touch input regions and accompanying symbols and characters. A third alternative is the use of controllable backlighting, wherein symbols or characters are variably illuminated in a translucent or transparent input element or key. A fourth alternative is the use of electronic labels which contain symbols or characters that can be reconfigured and reoriented.

Likewise, other input and output devices, such as the camera 129 or an electronic handwriting tablet for use with a handwriting stylus, for example, may be self configured by the relative positions of the first element 104 and the second element 106. In addition the operation of the input device must have the proper orientation. Handwriting recognition software must know whether the handwriting tablet is in a landscape or portrait positions. The same is true for joysticks and other similar devices.

As an additional feature, the relative positions of the elements may also select a service to be received. For example, the user may position the two elements 104 and 106 to cause the portable electronic device 100 to self configure as a cellular phone and receive incoming phone calls. The portable electronic device 100 may include an alert that notifies the user that a non-selected service is waiting to be received, such as an incoming page in this example. The user may therefore reposition the elements of the device 100 in order to cause the device 100 to self configure as a pager, whereupon the incoming page may be received and/or responded to.

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As a further feature, altering the operational configuration and mode of the device 100 may be useful in conserving battery life. Some operational modes, chosen by the user, may consume less battery life, given screen activity, screen size, or non real-time synchronous message versus real-time messaging (i.e., paging versus telephony). The operation modes may also dictate different reverse channel transmit power levels, also allowing for battery life conservation.

Still further, altering the configuration and operation mode of the device results in the need to align the antenna for optimum RF operation, typically in a vertical polarization. As shown in FIG. 7, when the device is configured in a landscape orientation the antenna will need to be in a first position extending the antenna in a optimum RF polarization as the device is operated by the user. FIG. 3 shows operation of the device configured in a portrait orientation, such as a cellular phone .

FIG. 9 shows detail of a first embodiment of the joint 112 of the present invention. The joint 112 includes a first fixed element 909 attached to the first electronic element 104, a second fixed element 909 attached to the second electronic element 106, and a connector element 903. The connector element 903 rotatably attaches to and connects the two fixed elements 909, and allows the first electronic element 104 to rotate in two planes with respect to the second electronic element 106.

FIG. 10 shows the first joint embodiment along with a positional sensor device arrangement. Exemplary fixed elements 909 include a shaft 1047. A fixed element 909 is affixed to the first and second electronic elements 104 and 106, while the shaft 1047 is adapted to fit rotatably within an opening in the connector element 903. The fixed elements 909 (or the connector element 903) may include a retainer device, such as the ridge or ring 1053, for example, that allows the components to securely snap together.

The joint 900 may include one or more positional detents. This may be a ridge (not shown) on the shaft 1047 which may interact with grooves, etc., in the connector element 903 to provide fixed positional detents.

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The fixed elements 909 each contain positional sensor devices (discussed below in conjunction with FIGS. 11-13) that interact with the connector element 903. The positional sensor devices are each connected to corresponding position sensor circuit boards 1035, and are therefore capable of determining a relative rotational position of each electronic element with respect to the connector element 903. When possessing data from both positions sensors and both position sensor circuit boards 1035, the portable electronic device 100 can determine a relative position of the first electronic element 104 with respect to the second electronic element 106.

Also shown in the figure is a bus 1039. The bus 1039 may pass through a hollow interior of the fixed elements 909 and a hollow interior of the connector element 903, and may be a single wire or lead, or a plurality of wires or leads. A positional information from a position sensor may be transmitted over the bus 1039. In addition, the bus 1039 may conduct electrical power between the electronic elements. Alternatively, the data bus 1039 may be external to the three joint components.

FIGS. 11-13 show various embodiments of the position sensor 932. FIG. 11 shows a first sensor embodiment wherein a face of a fixed element 909 may include a plurality of position sensor contacts 1152. A contact 1128 on the connector element 903 (only the contact 1128 is shown for clarity) may bridge pairs of position sensor contacts 1152, giving the corresponding position sensor circuit board 1035 a closed electrical circuit that may be used to determine a relative position of an electronic element 104 or 106. Due to the design of this sensor embodiment, only one pair of position sensor contacts 1152 may form a closed circuit at any time.

FIG. 12 shows a second sensor embodiment, wherein the position sensor comprises a variable resistor. The position sensor includes a fixed contact 1260, a resistive surface 1269, and a gap 1265 in the resistive surface 1269, all formed on a fixed element 909. A moving contact 1263 is affixed to the connector element 10003 (the connector element 903 is not shown for clarity). In use, the moving contact 1263 may

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rotate on the position sensor as the corresponding electronic element is moved. It should be understood that a wire or other lead must therefore extend from the moving contact 1263 to the position sensor circuit board 1035 (not shown). The resistance received by a corresponding position sensor circuit board 1035 will therefore vary according to the rotation of the position sensor.

The above description places the variable resistor on a fixed element 909. However, the variable resistor could alternatively be formed on an end of the connector element 903, with the moving contact 1263 being formed on a fixed element 909.

FIG. 13 shows a third sensor embodiment, wherein the position sensor comprises a magnet 1373 and a Hall Effect sensor 1377. The magnet 1373 is preferably affixed to an end of the connector element 903, and the Hall Effect sensor 1377 is affixed to or embedded in a fixed element 909. The magnet 1373 may be comprised of multiple magnetic north and south poles, and may be comprised of multiple magnets or magnetic poles of different strengths and orientations.

The Hall Effect sensor 1377 generates an electrical signal when in a magnetic field. The corresponding position sensor circuit board 1035 may use this electrical signal to determine a relative position.

FIGS. 14-15 show a second embodiment of the joint 112. In the second embodiment, the joint 112 is a ball type joint having a ball 147 attached to either the first or second elements. In a preferred embodiment, the ball 147 is attached to the first element 104. The ball 147 may optionally include a shaft 137 (see FIG. 20). The ball 147 is rotatably received in a socket 162 formed in the second element 106. The joint 112 therefore allows movement of the first element 104 in two planes in relation to the second element 106.

FIGS. 16-18 show detail of the socket 162. FIGS. 17 and 18 are views of FIG. 16 but from left and right sides, showing angle cuts (detents) designed to hold the two elements in predetermined positions for portrait and landscape configurations.

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FIG. 19 shows the two resulting predetermined positions of the first element 104 in relation to the second element 106.

FIG. 20 shows detail of the ball 147 and the socket 162. The ball 147 comprises at least two conductors 151 and 153, although more than two conductors could be employed. The two conductors 151 and 153 are separated by a strip of electrically insulating material 148. The optional shaft 137 also includes conductive regions 141 and 143, with the conductive regions 141 and 143 ending in the conductors 151 and 153 of the ball 147. A voltage potential may be placed across the two conductive regions 151 and 153 of the ball 147. A plurality of contacts 159 in the socket 162 press against the ball 147 in a spring-like fashion, and conduct electricity between the ball 147 and the second element 106. The plurality of contacts 159 may therefore be used to sense the position of the first element 104 in relation to the second element 106 by determining which contacts of the plurality of contacts 159 are conducting electricity. The conductive regions and the contacts therefore allow the portable electronic device 100 to sense the relative position by determining which contact(s) receives the voltage of conductor 151 and which contact(s) receives the voltage of conductor 153. The positional measurement resolution may be determined by the relative sizes (and numbers) of the conductive regions 151 and 153 of the ball 147, and also by the size, number, and placement of contacts 159.

Not only is the relative position sensed, but also electrical power may be transferred between the first element 104 and the second element 106 via the various embodiments of the joint 112. This is desirable because a power source is preferably located in only one of the two elements 104 or 106.

When the ball 147 is rotated, it may be possible that conductors 151 and 153 may be connected together, creating a short circuit. This may be prevented by the inclusion of a current sensing device that shuts down electrical power to the conductors 151 and

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153 when a short circuit is detected. When the short circuit is removed, (i.e., the ball 147 is rotated further), the current sensing device may re-apply power.

A further advantage of the ball joint socket and associated contacts is that a two-way digital communication may be performed through the joint 112. This two-way electrical communication may be accomplished by superimposing a digital signal on top of the DC power voltage level (electrical power) existing across the conductive elements 151 and 153 of the joint 112.

FIG. 21 shows a graph of a communication signal superimposed on the power voltage, while FIG. 22 shows the digital communication signal removed from the power voltage. The communication signal may be removed from the power voltage after the ball joint by using a capacitor to remove the DC component, leaving only the communications signal.

While the invention has been described in detail above, the invention is not intended to be limited to the specific embodiments as described. It is evident that those skilled in the art may now make numerous uses and modifications of and departures from the specific embodiments described herein without departing from the inventive concepts.

We claim:

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CLAIMS

1. A self configuring multiple element wireless portable electronic communication device, comprising:

at least a first electronic element and a second electronic element; and

a joint connecting said first electronic element and said second electronic element, said joint allowing movement in more than one plane of said first electronic element in relation to said second electronic element,

wherein said self configuring multiple element portable electronic device is capable of self configuring an operational mode based on a relative position of said first electronic element with respect to said second electronic element, and

wherein said device further includes a sensor in one of said first electronic element or said second electronic element for detecting said relative position of said first electronic element relative to said second electronic element.

2. The device of claim 1, wherein said first electronic element includes a display device capable of being configured as a landscape display device and a portrait display device, and

wherein said second electronic element includes at least one input device having a plurality of input elements, said plurality of input elements capable of being configured as a landscape input device and a portrait input device, and

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wherein said movement configures a display device orientation, an input device orientation, and an antenna configuration.

3. The device of claim 1, wherein said device has at least two operational modes and wherein said device self configures an operational mode based on a position of said first electronic element relative to said second electronic element.

4. The device of claim 1, wherein said display device is selected from the group consisting of a LCD, a CRT, a fluorescent display, a Braille output device, a TFT display, and a touch screen display;

wherein said display device is configured as a portrait display device when said first electronic element is configured as a portrait display device, and

wherein said display device is configured as a landscape display device when said second electronic element is configured as a landscape display device.

5. The device of claim 2, wherein said input device is selected from the group consisting of a keyboard, a joystick, a pointing device, a trackball, a touch pad, a rocker switch, a TTY input device, a Braille input device, a camera, a digital handwriting tablet, a pointing device, and a touch screen display,

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wherein said input device is configured as a portrait input device when said second electronic element is configured as a portrait input device,

wherein said input device is configured as a landscape input device when said second electronic element is configured as a landscape input device.

6. The device of claim 5, wherein said input device orientation is configured to a landscape input device to accommodate at least a full text keyboard, and as a portrait input device to accommodate at least a digital handwriting tablet or a phone keyboard,

wherein said antenna configures to a first position when said first electronic element is configured as said landscape display device and said antenna configures to a second position when said first electronic element is configured to said portrait display device.

7. The device of claim 1, wherein said joint conducts electrical power between said first electronic element and said second electronic element, and

wherein said joint allows a digital two-way communication signal to pass between said first electronic element and said second electronic element.

8. The device of claim 1, wherein said joint includes at least one predetermined positional detent.

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9. The device of claim 2, wherein said device further includes a transmitting means for transmitting configuration information to a server allowing said server to send appropriate data to said communication device in an appropriate format,

Wherein said configuration information is based on said at least one input device configuration and said display device configuration.

10. The device of claim 1, wherein said joint is a ball joint comprising:

a shaft affixed to said first electronic element of said hand-held device and having at least two lengthwise electrical conductor elements separated by an electrical insulator material;

a ball formed on an end of said shaft; and

a socket formed on said second electronic element, said socket for receiving said ball, said socket including a plurality of spring loaded contacts adapted to press against said ball, with said plurality of spring loaded contacts adapted to contact said at least two lengthwise electrical conductor elements and electrically communicate with said at least two lengthwise electrical conductor elements, and

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wherein said ball and said socket allow said first electronic element to move relative to said second electronic element, and wherein said contacts form a sensor for detecting a relative position of said first electronic element relative to said second electronic element, and

wherein a current sensing device shuts down electrical power to said at least two lengthwise electrical conductor elements if a short circuit occurs between said at least two lengthwise electrical conductor elements.

11. The device of claim 1, wherein said joint comprises:

a first fixed element attached to said first electronic element and including a first positional sensor device;

a second fixed element attached to said second electronic element and including a second positional sensor device; and

a connector element adapted to rotatably attach to and connect said first fixed element and said second fixed element, and

wherein said first fixed element, said second fixed element, and said connector element allow said first electronic element to move relative to said second electronic element, and wherein said first and second positional sensor devices detect a relative position of said first electronic element relative to said second electronic element, and

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wherein said joint further includes a bus extending through said first and second fixed elements and said connector element, said bus electrically connecting said first electronic element and said second electronic element.

12. The device of claim 11, wherein said positional sensor device comprises:

a plurality of electrically conductive portions embedded on an exterior surface of said first fixed element or said second fixed element; and

a bridging contact embedded on an end surface of said connector element, and

wherein said bridging contact is adapted to bridge across two electrically conductive portions of said plurality of electrically conductive portions, and wherein two bridged electrically conductive portions may be used to determine a rotational position of said positional sensor device.

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13. The device of claim 11, wherein said positional sensor device comprises:

a resistive surface ring, having a gap in said resistive surface ring;

a fixed contact on said resistive surface ring; and

a moving contact that is capable of being rotated relative to said resistive surface ring while remaining in electrical contact with said resistive surface ring;

wherein said positional sensor device provides a varying resistance as said moving contact is rotated.

14. The device of claim 11, wherein said positional sensor device comprises:

a magnetic ring affixed to said connector element; and

a Hall Effect sensor affixed to said fixed element and adjacent to said magnetic ring, and

wherein said magnetic ring contains varying magnetic polarities, and said Hall Effect sensor generates an electrical signal when rotated relative to said magnetic ring.

15. A method for self configuring an operational mode in a self configuring multiple element wireless portable electronic communication device, said self configuring multiple element portable electronic device having a first electronic element that may be moved in relation to a second electronic element, the method comprising the steps of:

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detecting a relative position of said first electronic element relative to said second electronic element; and

selecting an operational mode of said device based on said relative position.

16. The method of claim 15, wherein said first electronic element includes a substantially rectangular display device having a long dimension and wherein said detecting step is capable of detecting a portrait position where said long dimension is longitudinally oriented.

17. The method of claim 15, wherein said first electronic element includes a substantially rectangular display device having a long dimension and wherein said detecting step is capable of detecting a landscape position where said long dimension is laterally oriented.

18. The method of claim 15, wherein said second electronic element includes at least one input device having a long axis and a plurality of input elements, with said selecting step being further capable of configuring said plurality of input elements along a lateral axis of said second electronic element.

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19. The method of claim 15, wherein said second electronic element includes at least one input device having a long axis and a plurality of input elements, with said selecting step being further capable of configuring said plurality of input elements along a longitudinal axis of said second electronic element.

20. The method of claim 15, wherein said device has at least two operational modes and wherein said method selects an operational mode based on a position of said first electronic element relative to said second electronic element.

21. The method of claim 15, wherein said device selects a communication mode based on a position of said first electronic element relative to said second electronic element.

22. A self configuring wireless portable electronic communication device, comprising:

an electronic element configurable to a landscape orientation and a portrait orientation;

a position sensor to detect whether said electronic element is in said landscape orientation or said portrait orientation; and

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an antenna coupled to said sensor, configurable to a first antenna position when said electronic element is in said landscape orientation and said antenna configures to said second position when said electronic element is in said portrait orientation.

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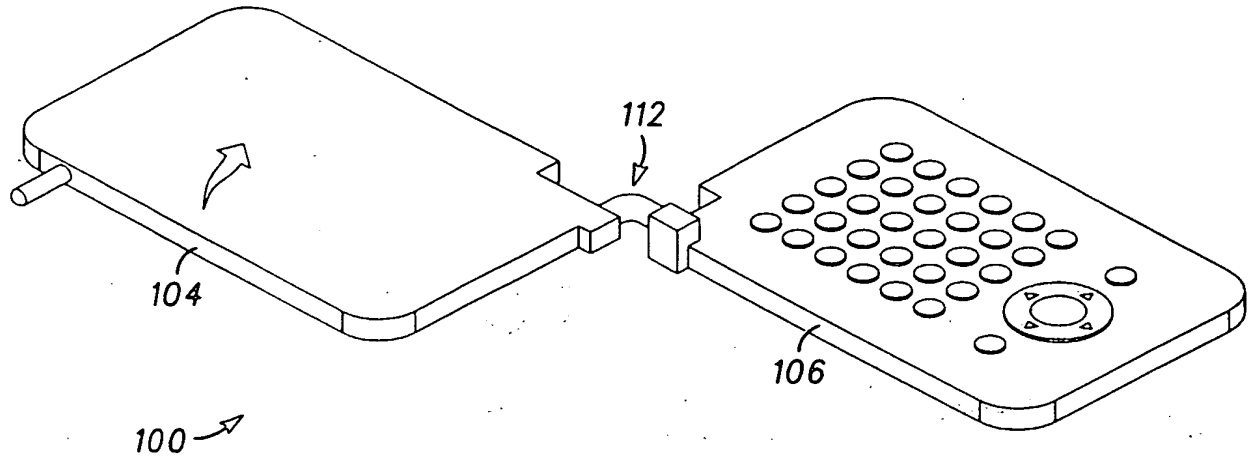

FIG. 1

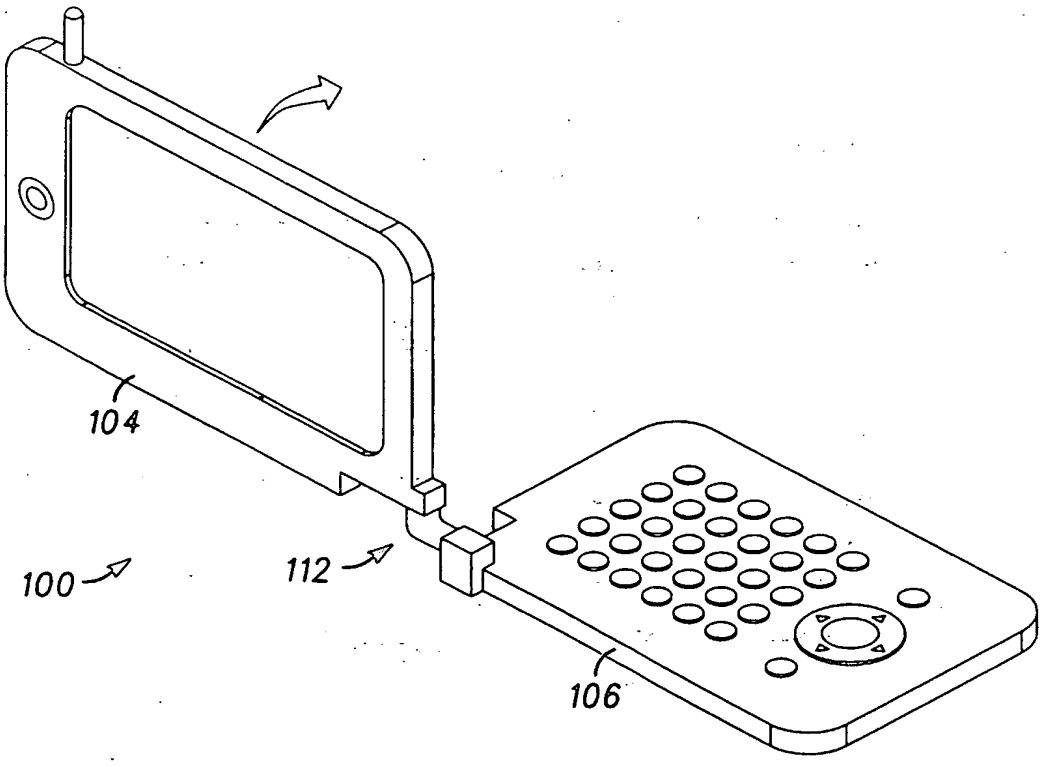

FIG. 2

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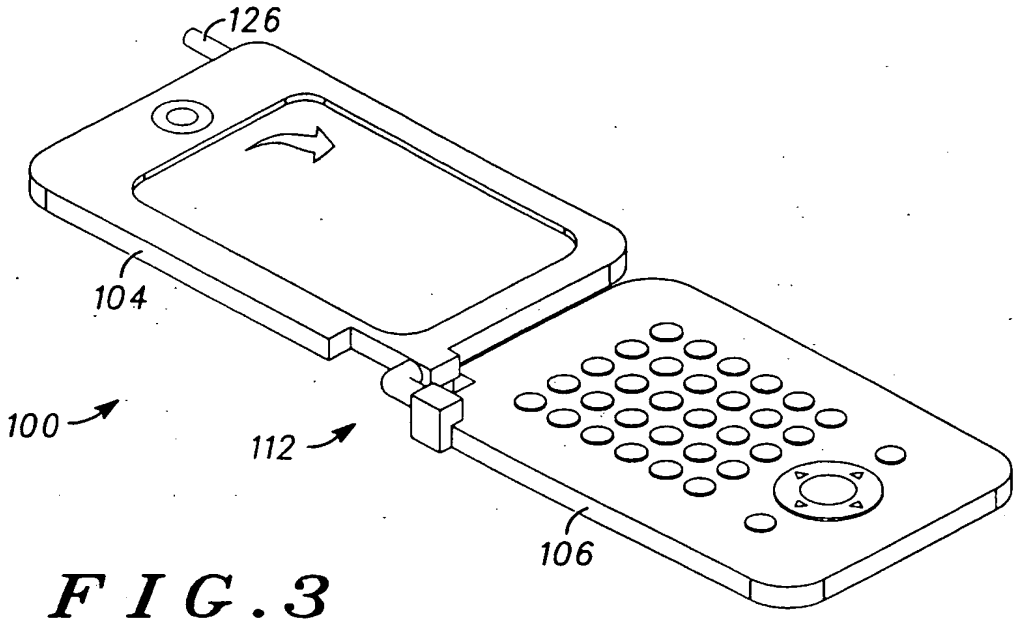

FIG. 3

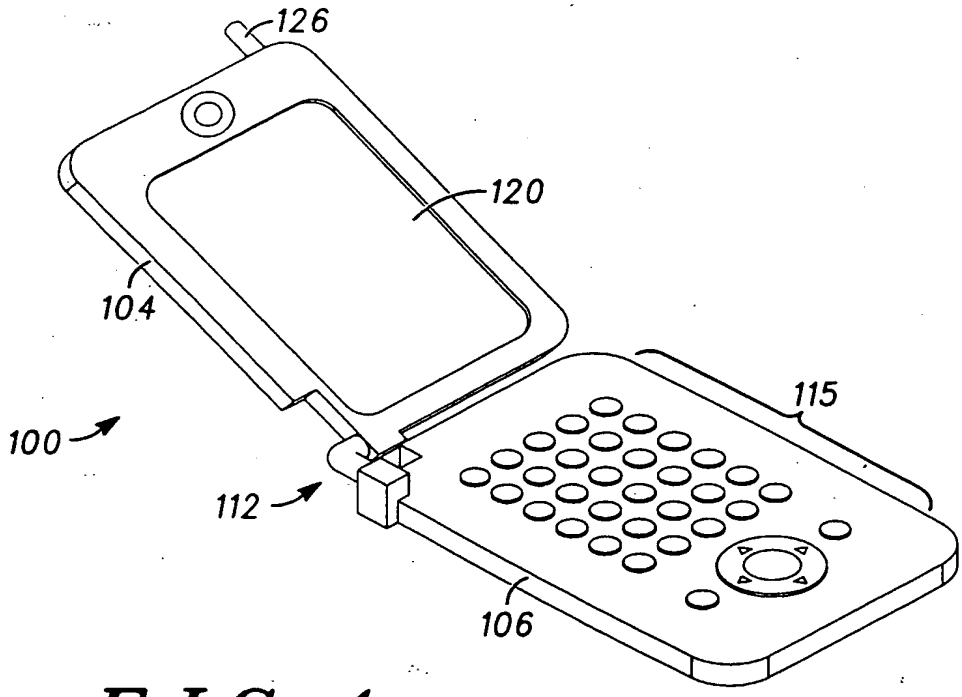

FIG. 4

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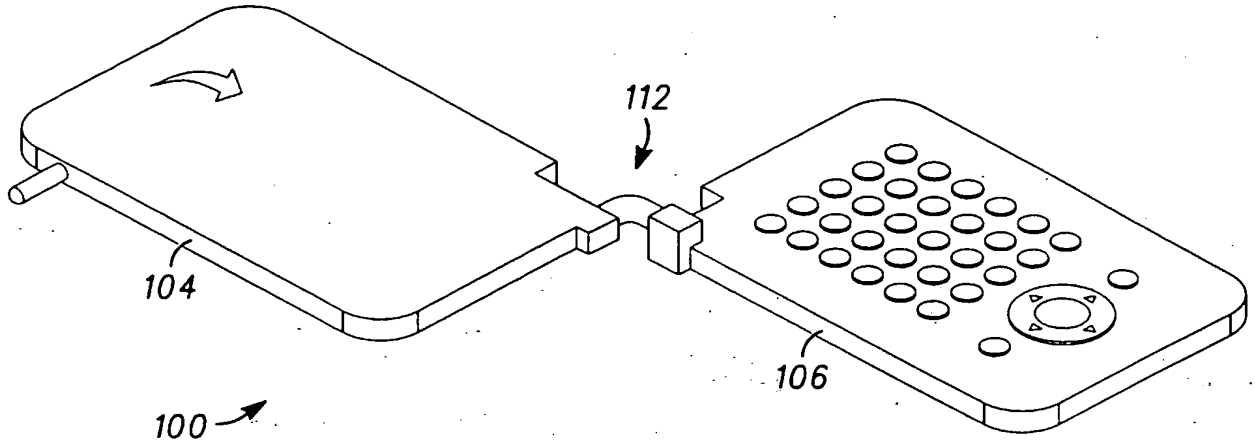

FIG. 5

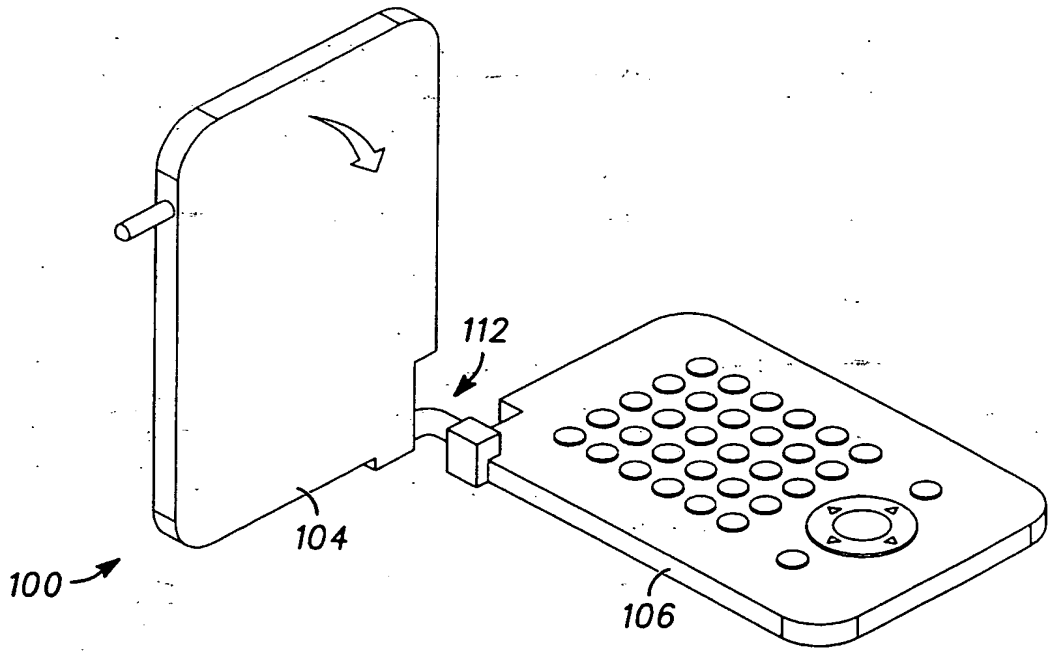

FIG. 6

SDOCID: <WO___0184269A2_I_>

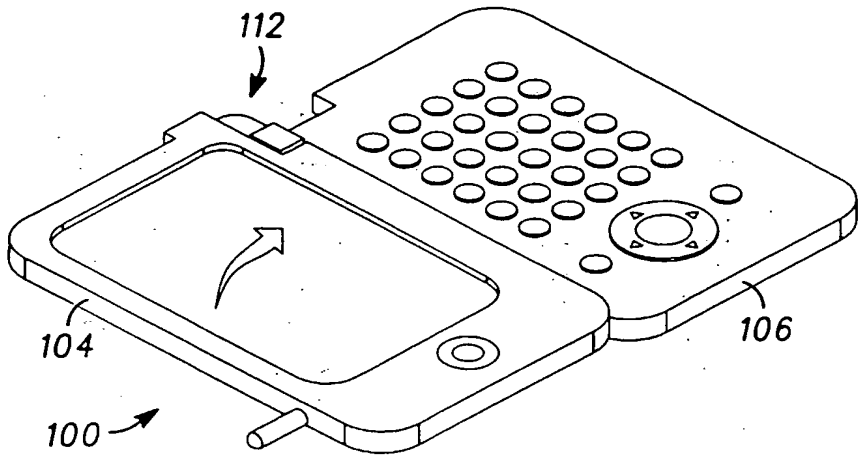

FIG. 7

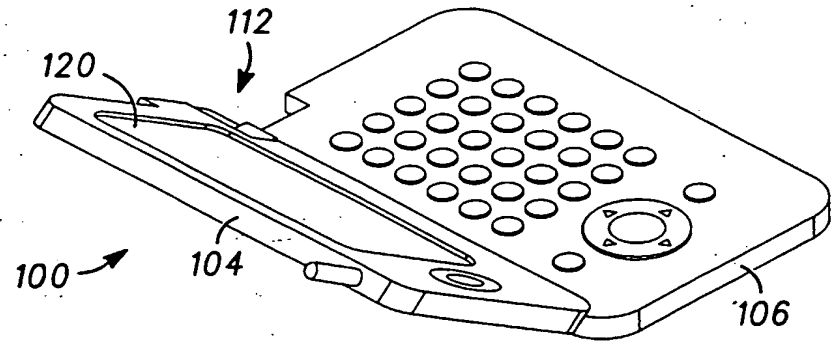

FIG. 8

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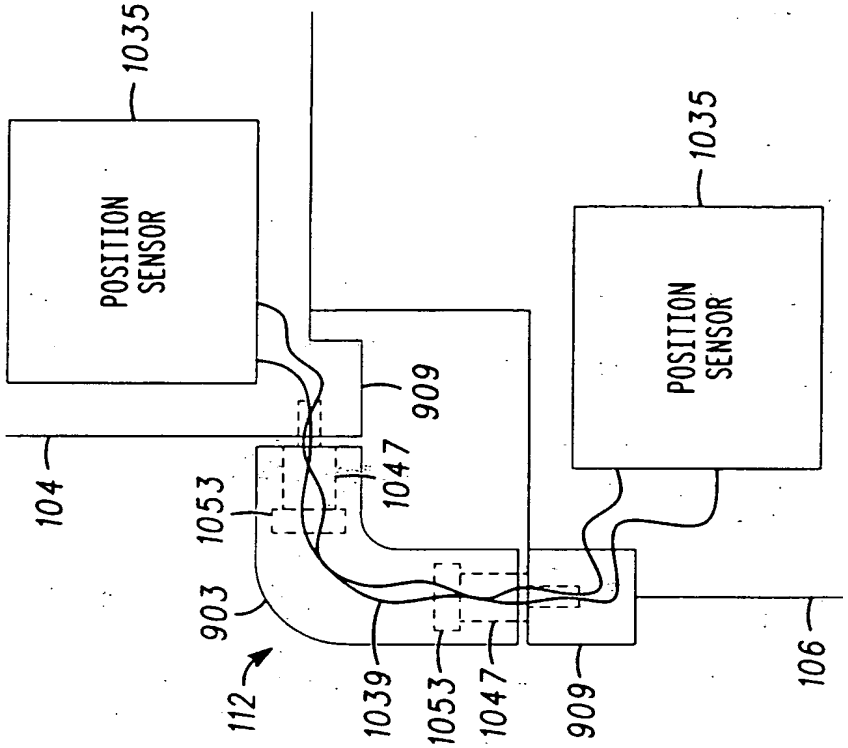

FIG.10

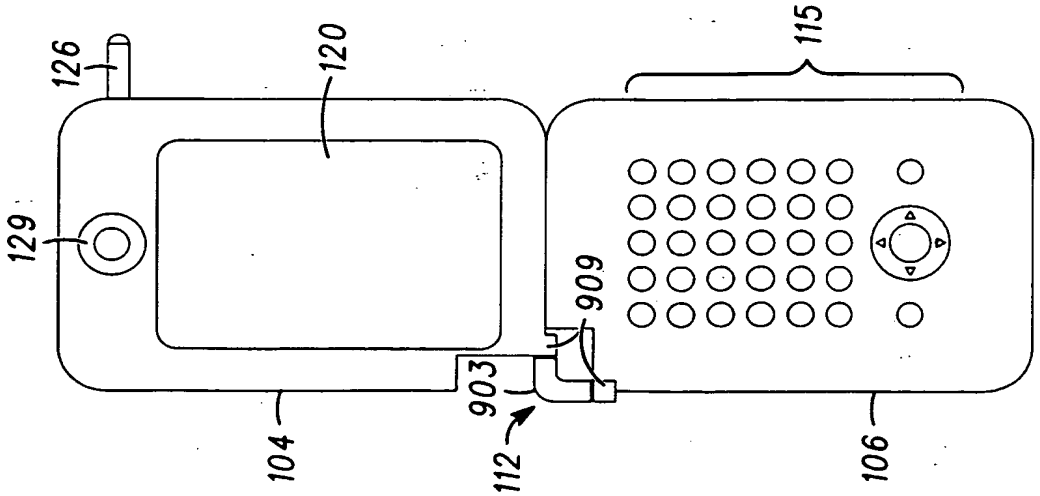

FIG.9

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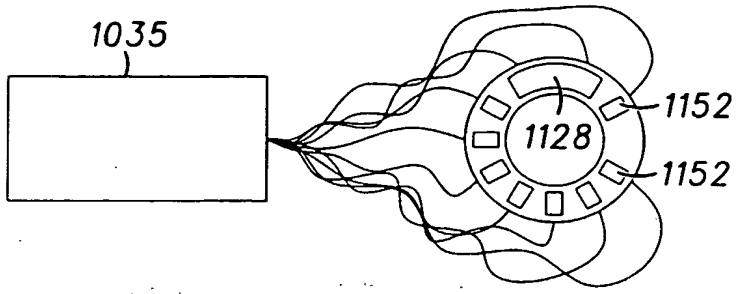

FIG.11

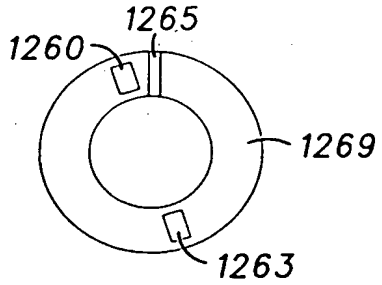

FIG.12

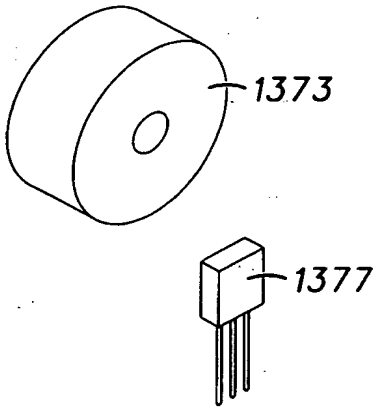

FIG.13

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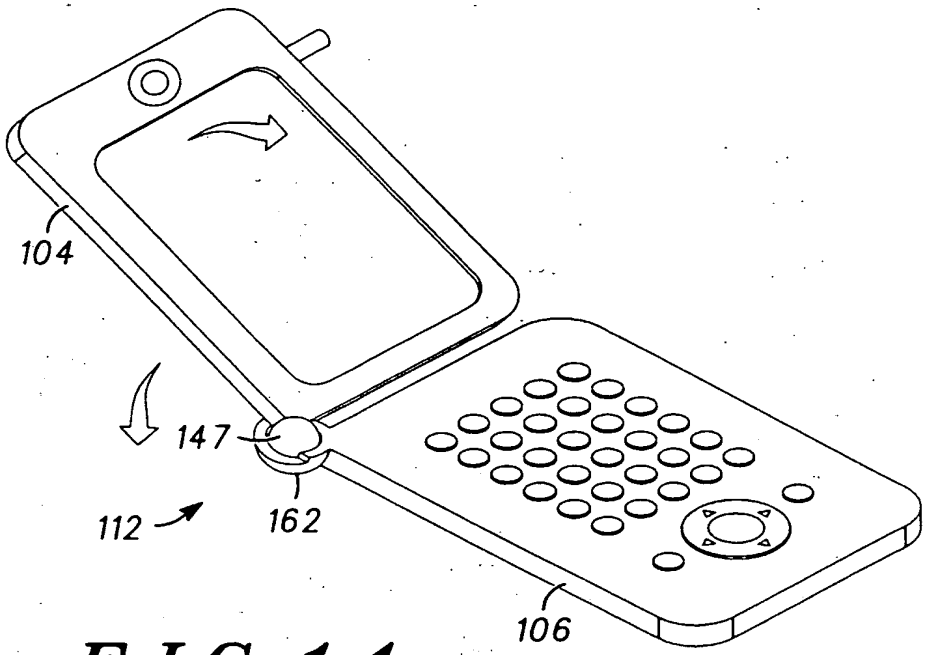

FIG.14

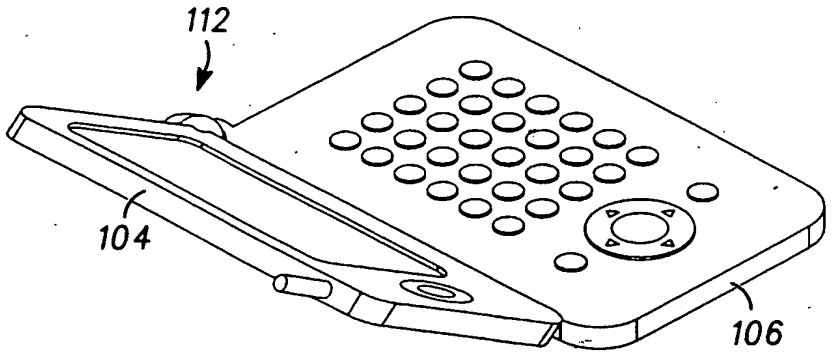

FIG.15

NSDOCID: <WO___0184269A2_I_>

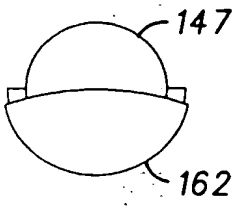

FIG.16

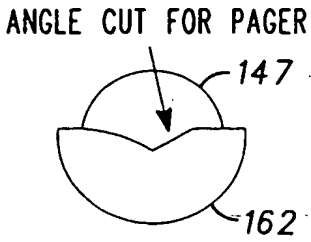

FIG.17

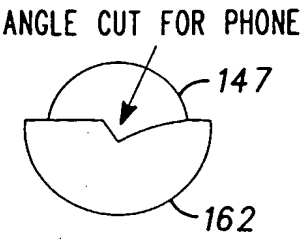

FIG.18

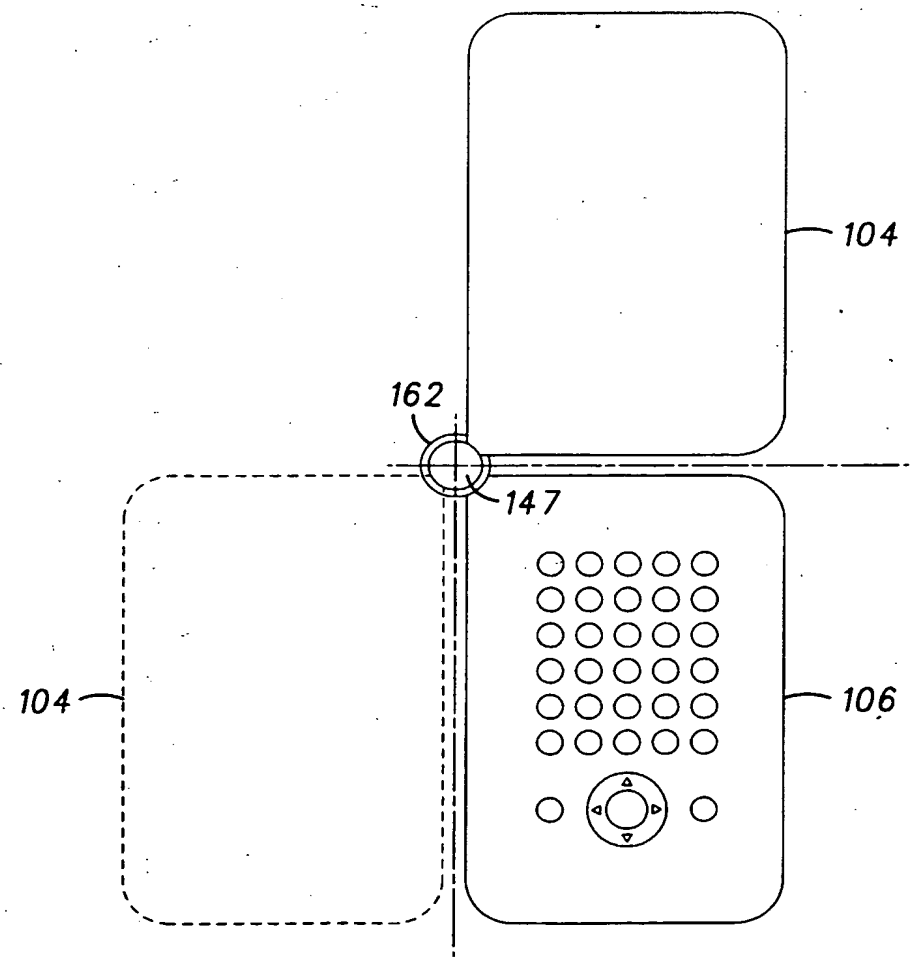

FIG.19

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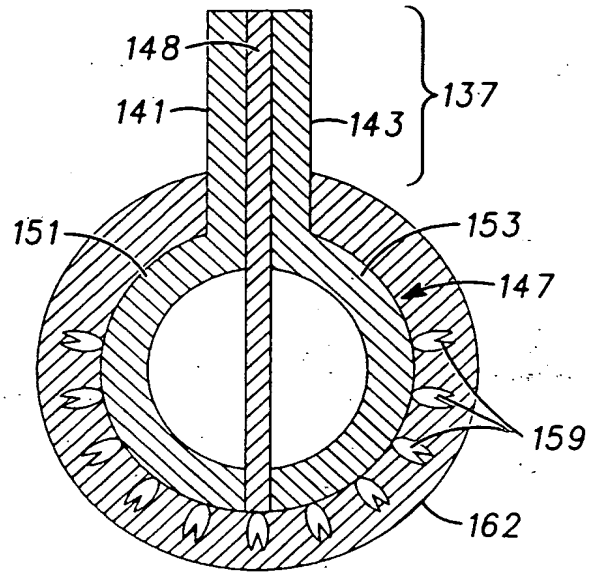

FIG. 20

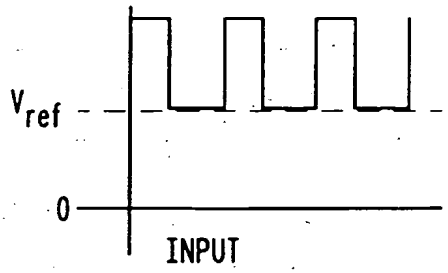

FIG. 21

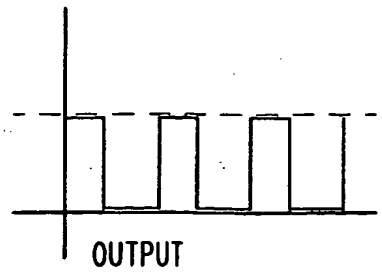

FIG. 22

!SDOCID: <WO___0184269A2_I_>

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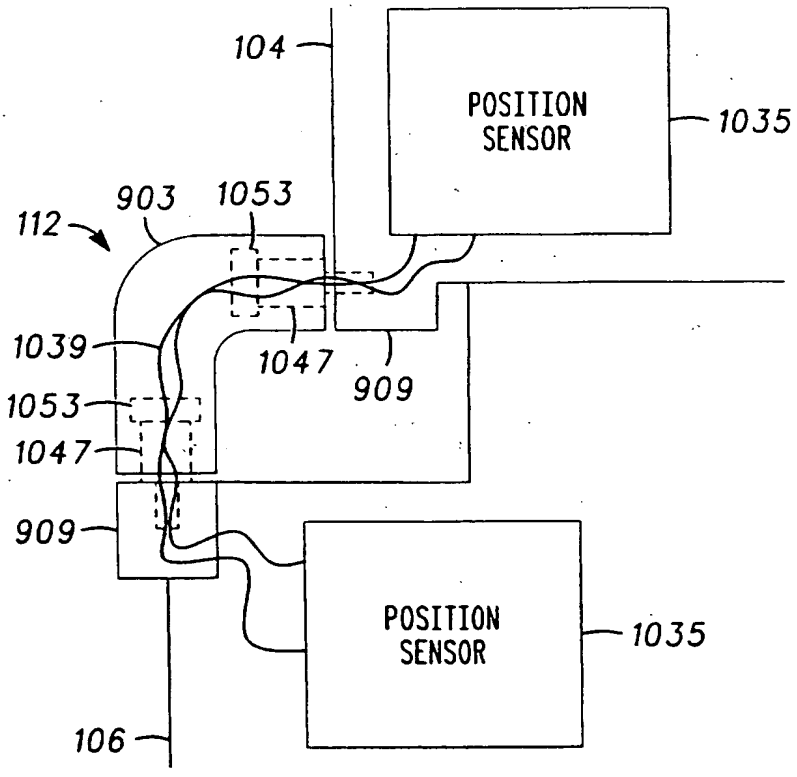
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SELF CONFIGURING MULTIPLE ELEMENT PORTABLE ELECTRONIC DEVICE



(57) Abstract: A self configuring multiple element portable electronic device (100) and method is provided. The device comprises at least a first electronic element (104) and a second electronic element (106) and a joint (112) connecting the first electronic element and the second electronic element, with the joint allowing movement in more than one plane of the first electronic element in relation to the second electronic element, wherein the self configuring multiple element portable electronic device is capable of self configuring an operational mode based on a relative position of the first electronic element with respect to the second electronic element. The method comprises the steps of detecting a relative position of the first electronic element relative to the second electronic element, and selecting an operational mode of the device based on the relative position.

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21 February 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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INTERNATIONAL SEARCH REPORT

Internat. .al application No.
PCT/US01/13208

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04B 1/38, 1/00

US Cl. : 455/11.1, 90, 552, 556, 557, 569

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 455/11.1, 90, 552, 556, 557, 569

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 93/07680 A (PAWLISH et al.) 15 APRIL 1993, Entire document.	1-9, 11, 14- 22
Y	US 6, 009, 336 A (HARRIS et al.) 28 DECEMBER 1999, FIGS. 2, 3, 5-9; ABSTRACT; COL. 1, LINES 23-63; COL. 2, LINE 40-COL. 3, LINE 24; COL. 8, LINES 1-66; COL. 10, LINE 33-COL. 11, LINE 67.	1-9, 11, 14-22
Y	US 6,002,946 A (REBER et al.) 14 DECEMBER 1999, Entire document.	1-9, 11, 14-22

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"O"	document referring to an oral disclosure, use, exhibition or other means		
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